# The Structure and Determinants of

# Inequality and Poverty Reduction in Ghana, 1988-92

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This paper presents findings that help us to understand the structure of inequality in the context of poverty reduction, using three rounds of Ghana Living Standard Survey conducted between 1988 and 1992. First, poverty reduction between 1988 and 1992 can be mainly attributed to improvements in both average levels of income and the distribution pattern of it in the informal/nonfarm sectors in Other Cities and in Rural Areas. Second, within a locality, economic changes -- whether positive or negative -- appear to affect all socio-economic groups in the same direction. These findings may explain why structural adjustment, which aimed at cutting back public sector employment and stimulating private sector activities, was successful in raising living standards in the Rural Areas and Other Cities, but not in Accra. The public sector is much larger in Accra than in Other Cities and Rural Areas. The contraction of the public sector in Other Cities and in Rural Areas was apparently compensated by income growth from the informal sectors. In contrast, in Accra, the contraction of its large public sector dominated the local economy -- the living standard of population in both formal and informal sectors decreased. Accra's economy will likely grow as its private and informal sectors grow. Based on these findings, an integrated regional strategy, taking into account the local socio-economic structure, may prove to be effective in achieving economic growth. Further research on informal sector activities will be required for developing economic strategies with a focus on achieving sustainable poverty reduction.

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***Executive Summary***

This study seeks to understand how the sources of economic growth in Ghana between 1988 and 1992 affected inequality and poverty reduction among different socio-economic groups in different localities. Several main findings have direct operational implications. First, economic growth between 1988 and 1992 can be mainly attributed to increases in economic activities in the informal sector in Rural Areas and Other Cities. These activities not only contributed to poverty reduction, but also contributed to improvement in distribution. Second, within a locality, economic changes -- whether positive or negative -- most likely affect all socio-economic groups in the same direction. It was surprising to see that even the living standard of population in public sector in Other Cities has improved somewhat, in spite of the budget cut in public sector.

These two findings may help to explain why structural adjustment, which aimed at cutting back public sector employment and stimulating private sector economic activities, was successful in raising living standard in the Rural Areas and Other Cities, but not in Accra. This is because in 1988 nearly 50 percent of Accra population depended on public sector employment while this percentage is much smaller for Other Cities and Rural Areas. Therefore, income loss from formal sector was able to be compensated by increased income from large informal sectors in Other Cities and in Rural Areas. By comparison, in Accra, the contraction of its large formal sector dominated the local economy. It would be expected that the living standard in Accra will improve as its informal sector becomes larger. Based on this experience, an integrated regional strategy, taking into account of the local socio-economic structure, may prove to be effective in achieving economic growth. Further research on informal sector activities will produce useful information for economic development strategies with a focus on achieving poverty reduction.

Another important finding was that poor do not benefit from education as much as non-poor do. This is because there is no income return to primary education, which is the highest education level that most poor can hope for. In Ghana, education only increases one's income after one's completion of middle school, a level that mostly the non-poor can achieve. This explains why education contributes to an increase, rather than a decrease in inequality. To increase the education benefit for the poor, it is necessary to design a primary education curricula to provide knowledge of income earning skills for the poor. This education should also provide knowledge for girls in family planning, hygiene, food preparation and nutrition, and therefore to increase the impact of economic growth on the improvements of the living standard.

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## I. Introduction

Ghana's economic recovery program, initiated in 1983, has been judged to have been a remarkable success story -- at least until the further shocks of public sector wage increases in 1992 and subsequent events. The GDP growth rate has maintained at a very reasonable level of around 5 per cent per annum over the decade. This was accompanied by a perceptible decline in poverty. From 1988 to 1992, the period for which statistical measures exist, poverty incidence in Ghana has decreased and the inequality, measured by Gini coefficient, also reduced slightly. The poverty reduction is accompanied by significant improvement in social indicators. Infant mortality decreased from 77 to 66 per 1000 live births, child mortality decreased from 84 to 57 per 1000, malnutrition rate decreased from 31 to 26 percent and total fertility rate decreased from 6.4 to 5.5 (World Bank, 1995b).

Despite the progress that Ghana has made, poverty remains a serious and extensive problem. For over 30 percent of the population, or about 5 million people, expenditure per capita in 1992 was less than US$25 a month. A further poverty reduction can be assured only if there is a continued economic growth with a reasonable distribution of its benefits. It is pointed out in Country Economic Memorandum (CEM, World Bank, 1995a) that suitable macroeconomic policies to promote private sector growth, sustainable agriculture sector policies and human capital investments are required if growth is to be sustained and poverty is to be reduced.

Poverty monitoring and profile have been conducted extensively in CEM and Poverty Assessment (World Bank, 1995b), mainly by calculating poverty and inequality indices, such as poverty incidence, poverty gap and Gini coefficient. This study extends the methodologies to first order stochastic dominance analysis, decomposition of poverty changes and regression analysis, to search for factors that may affect income and inequality. In addition, this study extends the measures of inequality beyond Gini coefficient to the generalized entropy class of measures. These are more comprehensive methodologies that will allow us to investigate how the post-reform growth affected inequality and poverty in different sectors of the economy among different localities. Our emphasis is to provide policy recommendations for improving development strategies to assure a more effective poverty reduction.

The rest of the paper is organized as following. Section II explains the data used in this paper. Section III uses stochastic dominance analysis and entropy class measures to investigate the inequality and social welfare changes. These changes are analyzed for Ghana as a whole, for each locality and for different socio-economic group among different localities, respectively. Section IV decomposes the change in poverty incidence into three components: mean expenditure change, population shift and distribution change,

which is conducted for Ghana as a whole and also for each locality, respectively. Section V uses, again, entropy class measures and regression analysis to determine household characteristics that affect inequality and expenditure. Finally, Section VI provides main findings and policy recommendations. Technical details are presented in Appendix A and B.

## *II. Data*

The data used in this study are Ghana Living Standards Surveys (GLSS) conducted in 1987/88 (GLSS1), 1988/1989(GLSS2) and 1991/92 (GLSS3), respectively. The GLSS is a nationwide household survey undertaken by the Ghana Statistical Service. The GLSS provides data on various aspects of demographic characteristics, and economic and social activities at both household and individual levels. Since the survey questionnaire of GLSS3 was changed from that of GLSS1 in several significant ways, the comparability of the two data sets have been questioned by several studies (Coulombe and McKay, 1995, Jones and Ye, 1995, Demery and Mehra, 1997). In Demery and Mehra's study, it is demonstrated that GLSS2 and GLSS3 are more comparable than GLSS1 and GLSS3 for expenditure based analysis. The corrections on expenditure levels by Demery and Mehra, however, do not affect distribution in any significant way. The sensitivity analysis shows that the comparison between GLSS1 and GLSS3 and GLSS2 and GLSS3 yield consistent results. We present all results from the comparisons of GLSS1 and GLSS3 and the main results from GLSS2 and GLSS3, with a focus on the comparison of GLSS1 and GLSS3.

## *III. The changes in inequality and social welfare*

Using Gini as an index, income distribution has improved slightly between 1988 and 1992 in Ghana, by 4 percent. This section uses entropy class measures to extend the analysis that Gini has provided. The advantage of entropy class of measures to Gini are two folds. First, they can be decomposed into within- and between-group inequality. The within-group index can explain how inequality has changed within each locality while Gini coefficient can not be decomposed into sub-groups. The between-group inequality index can examine how household characteristics such as occupation and education level of household head might explain inequality.

Second, different entropy class of measures are sensitive to different parts of the distribution while Gini coefficient is mainly sensitive to the changes in the middle part of a distribution. This study uses three entropy class of measures: E(0), the mean log deviation, sensitive to the changes at the lower end of a distribution; E(1), the Theil index, equally sensitive to changes across a distribution; and E(2), sensitive to the changes at the higher end of a distribution.[1] In this section, stochastic dominance analysis and entropy

[1] For a detailed explanation and the formulas of these indices, see Ahuja et al. (1997) appendix A, which is reproduced in Appendix B of this paper.

class measures are used together to examine the changes in inequality and social welfare for Ghana as a whole (section 3.a), for different localities (section 3.b) and for different socio-economic groups in each locality (section 3.c).

*3.a) The changes in inequality and social welfare in Ghana*

Table 1 presents the entropy class of measures for inequality in 1988, 1989 and 1992. The comparisons between GLSS1 and GLSS3 and GLSS2 and GLSS3 show very similar patterns. By any measurement, inequality has improved in Ghana. Gini shows an improvement less than that of entropy class of measures, which give a more complete picture about what happened to each part of the distribution. E(0) has the highest percentage change, which indicates that the improvement of inequality mainly comes from the lower end of income distribution. Little change occurred at the higher end of income distribution between GLSS1 and GLSS3, as indicated by the small percent change (-1 percent) in E(2) between the two years. Using adjusted data of GLSS2 and GLSS3, however, a significant improvement in inequality also shows at the upper end of distribution.[2]

Table 1. Ghana: Expenditure Per Capita and Inequality, GLSS1(1988), GLSS2(1989) and GLSS3(1992)

| *Measure* | *1988* | *1992* | *Percent change* | *1989* | *1992* | *Percent change* |
|---|---|---|---|---|---|---|
| | | | | *With adjusted data*[1] | | |
| Mean Expenditure per capita (1992 Cedis) | 198345 | 214992 | 8.4 | 147193 | 172553 | 17.2 |
| Gini coefficient | 35.2 | 33.8 | -4.00 | 37.4 | 35.3 | -5.6 |
| E(0) | 20.9 | 18.7 | -10.5 | 23.7 | 21.1 | -11.0 |
| E(1) | 22.0 | 20.7 | -5.91 | 25.0 | 22.7 | -9.2 |
| E(2) | 30.3 | 29.9 | -1.32 | 36.3 | 33.2 | -8.5 |

1 Adjusted data was provided by Demery and Mehra, see their paper for details.

The above analysis shows that inequality has been reduced in Ghana, and one could therefore say that social welfare has improved given a social welfare function that equality is desired. An alternative way to monitor welfare changes is through the first order stochastic dominance analysis, which plots the cumulative distribution functions of the income distributions. If distribution function A lies nowhere above and somewhere below B, then A displays first-order dominance over B; that is A has a higher level of social welfare than B, given a social welfare function that is individualistic and increasing in income regardless of its distributional judgments.[3]

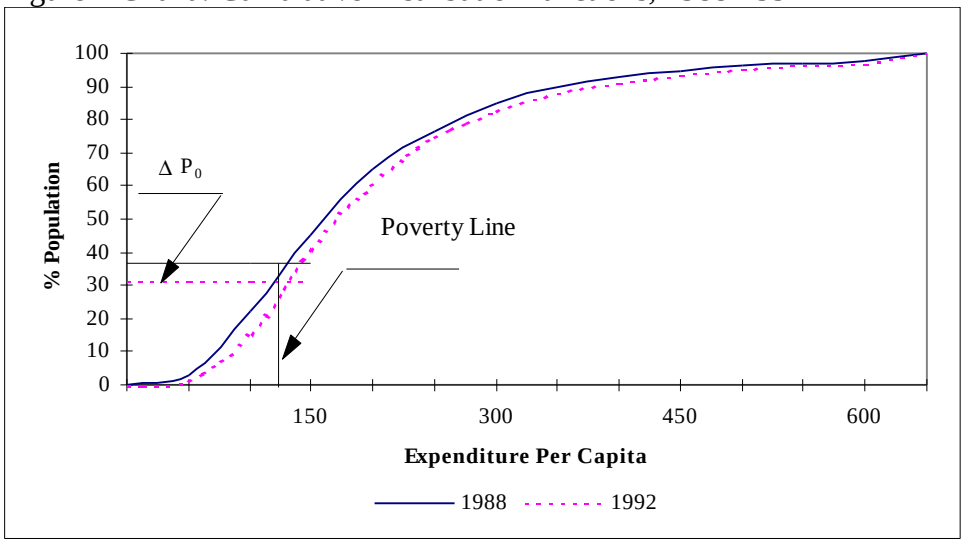
Figure 1 presents a stochastic dominance analysis for GLSS1 and GLSS3 data. It

[2] Uncommon food items were excluded from GLSS3 to make the expenditure level comparable between GLSS2 and 3. However, excluding uncommon food items, which are mainly consumed by the better off households, is least likely to affect inequality at the lower end of distribution in 1992. This is evident in Table 1.

[3] The theorem is established by Saposnik(1981).

shows that 1992 distribution dominates 1988 distribution. This demonstrates that there was a general improvement in living standard in Ghana from 1988 to 1992, as measured by expenditure per capita. It shows that, the improvement especially came from between 20 to 65 percentile of population, represented by the wide gap between the two distributions in this range. Even for the population which remained in poverty, the social welfare has improved. There appears to be minimum improvement among top five percent of the population. This confirms the findings in CEM, which states that the improvement in income occurred mainly at the lower end of income distribution, through favorable changes in terms of trade for the rural poor involved in farm and nonfarm activities (Jones and Ye, 1995). The comparison between GLSS2 and GLSS3 shows very similar trend, which is presented in the Appendix A.

Figure 1 Ghana: Cumulative Distribution functions, 1988-1992




*3.b) <u>Changes in inequality and social welfare by locality</u>*

Although on average the expenditure per capita and the inequality has been improved for Ghana between 1988 and 1992, as shown above, more detailed analysis reveals that the improvement only occurred in the Rural Areas and the Other Cities, but not in Accra. According to the calculation of the CEM (1995), between 1988 and 1992, poverty incidence fell from 42 to 34 percent in rural areas and from 33 to 28 percent in Other Cities, respectively. Poverty incidence, however, increased in Accra from nine to 23 percent, which was nevertheless still the lowest poverty incidence among the three localities in 1992.

Given the poverty reduction in Rural Areas and Other Cities and the poverty increase in Accra, a natural question one would like to ask is how the degree of inequality has evolved within these different localities and how much each locality contributed to the over all inequality? Table 2a presents the within-group inequality and the weighted within-group inequality of each locality, respectively. In addition, the contribution of each

locality's inequality to overall inequality of Ghana was presented, which adds up to 100 percent (see Appendix B for definition). In general, the within-group inequality among the three localities explain most of overall inequality ($E(a)_w$ in the last row of Table 2a almost equal $E(a)$ in Table 1).

Several additional findings are worth noting. First, in spite of 17 percent of decrease in mean expenditure per capita in Accra from 1988 to 1992, Accra still enjoyed the highest average living standard in the country in 1992. Second, in Accra not only mean expenditure has decreased, but also inequality has worsened. In contrast, in Other Cities and Rural Areas, mean expenditure has increased and inequality at the lower end of distribution has decreased, implying a pro-poor growth pattern. Third, contributions to the inequality at the lower end of distribution has increased for Accra, but decreased for Other Cities between 1988 and 1992. In short, the economic decline in Accra hurts the low-income population most, while the economic growth in Other Cities and Rural Areas benefits the low-income population most.

Table 2a. Ghana: Within-group inequality and contribution to overall inequality by locality, GLSS1(1988) and GLSS3(1992)

| *Measure* | | *E(0)*[4] | *%* | | *E(1)* | *%* | | *E(2)* | *%* |
|---|---|---|---|---|---|---|---|---|---|
| | 1988 | 1992 | *Change* | 1988 | 1992 | *Change* | 1988 | 1992 | *Change* |
| **Accra** | | | | | | | | | |
| Mean expenditure | 313962 | 260418 | -17.1 | | | | | | |
| $E(a)_j$ | 18.5 | 21.4 | *15.7* | 20.9 | 23.6 | *12.9* | 29.9 | 33.4 | *11.7* |
| Weighted | 1.5 | 1.8 | 20.0 | 2.7 | 2.3 | -14.8 | 6.2 | 4.0 | -35.5 |
| Contribution (%) | *7.9* | *9.5* | *20.3* | *13.4* | *11.5* | *-14.2* | *21.8* | *13.5* | *-38.1* |
| **Other Cities** | | | | | | | | | |
| Mean expenditure | 206162 | 224783 | *9.0* | | | | | | |
| $E(a)_j$ | 20.2 | 18.9 | *-6.4* | 21.6 | 20.2 | *-6.5* | 29.7 | 26.9 | *-9.4* |
| Weighted | 5.2 | 4.7 | -9.6 | 5.8 | 5.3 | -8.6 | 8.3 | 7.3 | -12.0 |
| Contribution (%) | *26.8* | *25.6* | *-4.5* | *28.4* | *25.8* | *-9.2* | *29.1* | *24.7* | *-15.1* |
| **Rural** | | | | | | | | | |
| Mean expenditure | 180677 | 205771 | 13.9 | | | | | | |
| $E(a)_j$ | 19.4 | 17.9 | *-7.7* | 19.9 | 20.0 | *0.5* | 25.7 | 29.9 | *16.3* |
| Weighted | 12.7 | 11.6 | -8.7 | 11.9 | 12.8 | 7.6 | 14.0 | 18.3 | 30.5 |
| Contribution (%) | *65.3* | *64.9* | *-0.6* | *58.2* | *62.7* | *7.7* | *49.1* | *61.7* | *25.7* |
| **Ghana** | | | | | | | | | |
| $E(a)_w$ | 19.5 | 18.4 | *-5.6* | 20.5 | 20.4 | *-0.5* | 28.6 | 29.7 | *3.8* |

*Mean expenditure is in 1992 Accra Cedis. A negative percent change indicates an improvement in inequality, see Appendix B for details.

[4] The Entropy class measures are additive with the weight

$$E(a) = \sum_{j=1}^{m} \{ (\frac{n_j m(y)_j}{n m(y)})^a (\frac{n_j}{n})^{1-a} \} E(a)_j$$

where $a$ =0,1, and 2, j is the sub-group of the population and $m(y)$ is the mean expenditure per capita.

Table 2b presents the same analysis as in Table 2a, but using GLSS2 and GLSS3, instead. Main results remain consistent with that of GLSS1 and GLSS3 comparison. First, inequality has increased in Accra, but decreased in Other Cities and Rural Areas for most part. Second, Accra has the highest average living standard among all localities. Third, contributions to the inequality at the lower end of distribution has increased for Accra, but decreased for Other Cities and Rural Areas.

Table 2b. Ghana: Inequality by locality, GLSS2(1989) and GLSS3(1992), adjusted data

| *Measure* | | *E(0)* | *%* | | *E(1)* | *%* | | *E(2)* | *%* |
|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1992 | *Change* | 1989 | 1992 | *Change* | 1989 | 1992 | *Change* |
| **Accra** | | | | | | | | | |
| Mean expenditure | 207439 | 211949 | 2.2 | | | | | | |
| $E(a)_j$ | 22.4 | 23.5 | 5.2 | 22.4 | 25.6 | 14.3 | 28.3 | 37.1 | 31.0 |
| Weighted | 2.0 | 1.9 | -4.9 | 2.1 | 2.1 | -2.3 | 2.8 | 3.0 | 5.6 |
| *Contribution (%)* | *9.0* | *9.3* | *3.8* | *12.0* | *11.6* | *-3.5* | *14.5* | *14.0* | *-3.6* |
| **Other Cities** | | | | | | | | | |
| Mean expenditure | 167510 | 188283 | 12.4 | | | | | | |
| $E(a)_j$ | 24.3 | 20.0 | -17.5 | 27.9 | 21.4 | -23.2 | 46.6 | 29.1 | -37.5 |
| Weighted | 5.6 | 5.0 | -11.4 | 5.5 | 4.7 | -14.3 | 7.7 | 5.6 | -27.7 |
| *Contribution (%)* | *25.0* | *24.1* | *-3.3* | *31.0* | *26.3* | *-15.3* | *40.0* | *26.4* | *-34.0* |
| **Rural** | | | | | | | | | |
| Mean expenditure | 132218 | 161853 | 22.4 | | | | | | |
| $E(a)_j$ | 22.0 | 20.6 | -6.3 | 22.2 | 22.0 | -0.9 | 29.1 | 33.2 | 14.0 |
| Weighted | 14.9 | 13.8 | -7.7 | 10.0 | 11.1 | 10.4 | 8.8 | 12.6 | 43.5 |
| *Contribution (%)* | *66.1* | *66.6* | *0.7* | *57.0* | *62.1* | *9.1* | *45.5* | *59.6* | *31.0* |
| **Ghana** | | | | | | | | | |
| $E(a)_w$ | 22.6 | 20.7 | -8.3 | 17.6 | 17.8 | 1.2 | 19.3 | 21.1 | 9.5 |

Figures 2 to 4 present the stochastic dominance analysis for the three localities. Figure 2 shows in Accra, 1988 distribution dominates 1992 distribution, indicating a decline in social welfare. The decline in social welfare is especially severe for the population of lower and middle incomes, represented by the wider gap between the two cumulative functions in the lower and middle part of the distribution. Figure 3 shows that there is a general improvement in social welfare for the population residing in Other Cities. As for rural areas, Figure 4 shows that the expenditure per capita has improved for majority of the population. There was, however, little improvement for the upper 10 percent of the population. The same analysis for GLSS2 and GLSS3 shows very similar patterns for Rural Areas and Other Cities. However, for Accra, GLSS2 and GLSS3 comparison shows that the welfare in 1989 is better off for some parts of distribution, but worse off for others. Graphs are presented in Appendix A.

Figure 2 Accra
Cumulative distribution functions

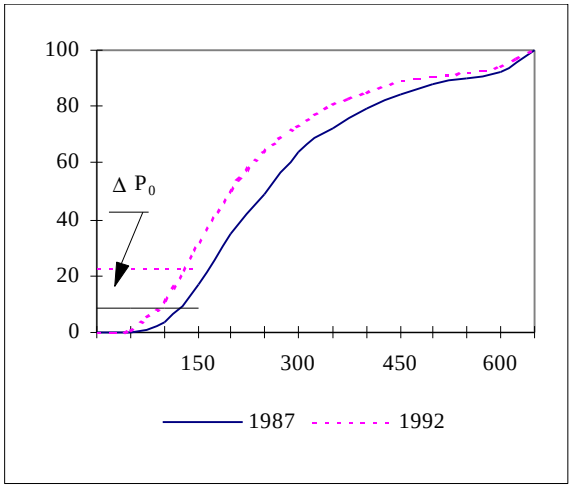



Figure 3 Other Cities
Cumulative distribution functions

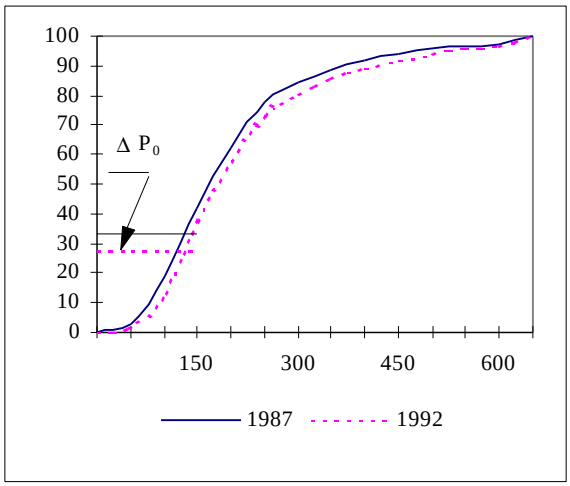
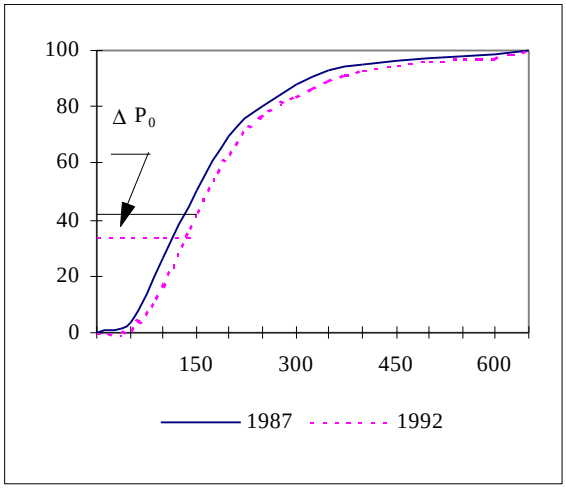



Figure 4 Rural Areas
Cumulative distribution functions




In conclusion, the above analysis confirms the results from past studies that social welfare has improved in Ghana from 1988 to 1992; in terms of expenditure per capita and inequality, mostly at the lower end of the income distribution. However, further analysis shows that the improvement happened only in Other Cities and in Rural Areas. In Accra there is a severe decrease in social welfare, in terms of expenditure level and income inequality. In Other Cities and Rural Areas, the expenditure level has improved. In addition inequality has improved for Other Cities through out the whole distribution, but for Rural areas, it mostly occurred at the lower end of distribution.

*3.c) Changes in inequality and social welfare by locality and socio economic groups*

As demonstrated above, there are significant differences in the social welfare changes among different localities. To see if these changes are universal within a locality

across different socio-economic groups, the stochastic dominance analysis are conducted for different socio-economic groups within each region. We distinguish two groups in Accra : wage earners of the formal and the informal sectors. For Other Cities we add another group to theses two-- "food-crop farmers" since this a significant group in this region. Lastly, for the rural areas we distinguish three groups: "food-crop farmers", "export crop farmers" and "non-farm income earners". The classification of these groups were based on the major source of income.

Table 3 gives proportion of population and number of observations of each socio-economic group. It shows that between 1988 and 1992, the proportion of export and food crop farmers have both decreased. There is a significant decline in the proportion of formal employees in Accra and a small decline in Other Cities. The proportion of informal employees has increased by 18 percent in Accra, compared with that of 10 percent in Other Cities. We will only conduct analysis on the groups that account for more than 15 percent of population in each locality (more than 100 observations).

Table 3 Ghana: Proportion of population by socio-economic groups

| | Accra | | Other Cities | | Rural areas | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 | 1988 | 1992 |
| Export farmers | 0.0 | 0.0 | 0.3 | 1.8 | 10 | 8 | 6.7 | 5.8 |
| | | | (2) | (20) | (192) | (210) | | |
| Food crop farmers | 1.3 | 0.0 | 20 | 15 | 60 | 57 | 45 | 42 |
| | (3) | | (166) | (161) | (1187) | (1628) | | |
| Rural non-farm | 0.0 | 0.0 | 0.0 | 0.0 | 23 | 28 | 15 | 19 |
| | | | | | (436) | (838) | | |
| Wage formal | 49 | 40 | 27 | 26 | 4.4 | 6.3 | 14 | 14 |
| | (163) | (176) | (245) | (286) | (142) | (203) | | |
| Urban informal | 45 | 53 | 50 | 55 | 0.0 | 0.0 | 17 | 18 |
| | (141) | (234) | (387) | (594) | | | | |
| Other | 4.7 | 7.0 | 2.7 | 2.2 | 2.6 | 0.7 | 2.8 | 1.6 |
| | (28) | (47) | (52) | (58) | (27) | (66) | | |

* Numbers in parenthesis are number of observations.

Interestingly enough, the differences in changes in distribution for different socio-economic groups within each locality are much less significant than the differences among different localities. For example, Figures 5 and 6 show that the distribution of urban formal and informal groups in Accra have very similar shape. In comparison, the distribution of Accra and Other Cities have striking differences as shown in Figures 2 and 3. This may indicate that within a locality, economic changes -- whether positive or negative -- most likely affect all socio-economic groups in the same direction. This suggests that the population in different socio-economic groups are integrated within the same local economy. This phenomena seems to call for an integrated economic development strategy in a region. For example, in a poor region, a sustainable health care provision must be accompanied by economic growth. It also points us to possible geographical targeting as a way of reducing regional inequalities.

Within each locality there are some interesting differences with respect to the changes of social welfare, though not as striking as the difference between the localities. In Other Cities, the improvement for urban-formal group is much smaller than that of urban-informal group; while there is a relatively large improvement at the lower distribution of the urban informal group, there is virtually no improvement for the lower distribution of the urban formal group(see Figures 7 and 8). For food crop farmers in the Other Cities, improvements only occur at the upper 40 percent of the distribution (see Figure 9). In rural areas, the improvement occurs mostly among food crop farmer and rural non-farm households (Figures 10 and 11). For export farmers, improvement only occurs at the lower distribution; for upper distribution, there is little improvement and at some range, social welfare is even worsened (see Figure 12).

Figure 5 Accra, wage formal

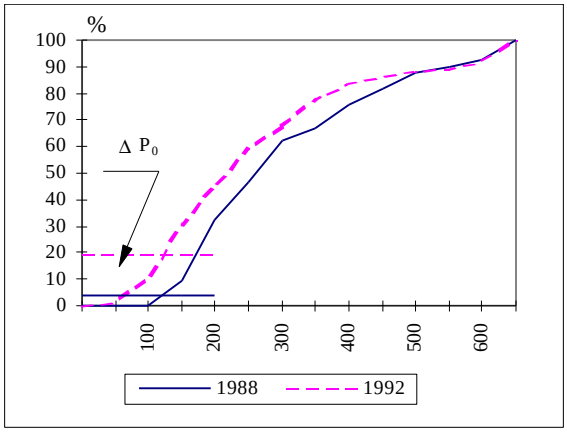



Figure 6 Accra, wage informal

Cumulative distribution functions

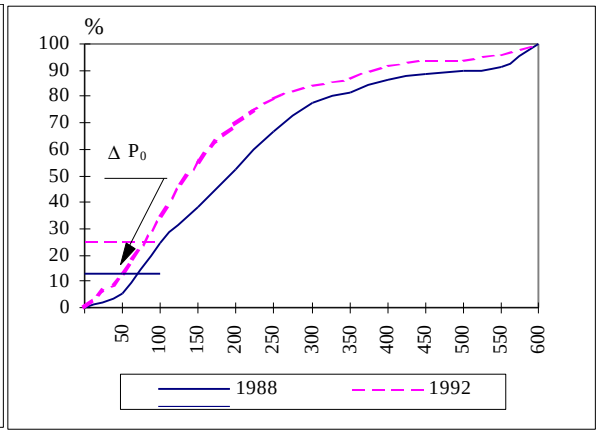


Figure 7 Other Cities, wage formal

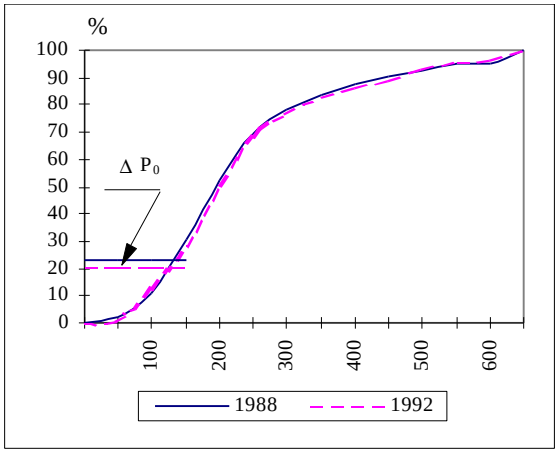



Figure 8 Other Cities, wage informal

Cumulative distribution functions

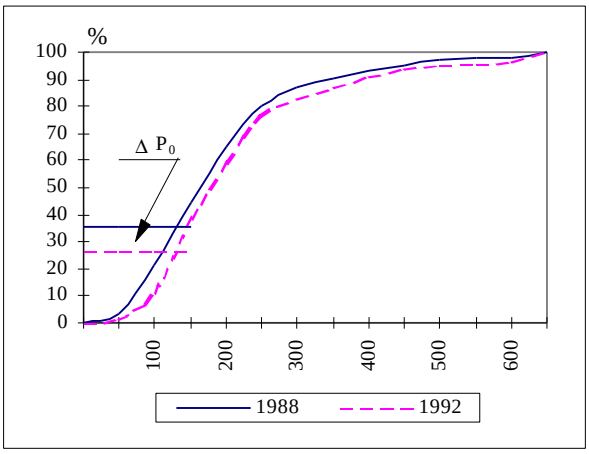



Figure 9 Other Cities, food-crop farmers

Cumulative distribution functions

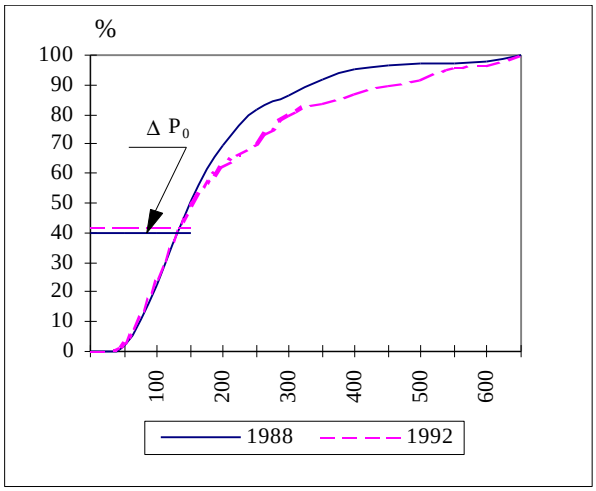



Figure 10 Rural Areas, food-crop farmers

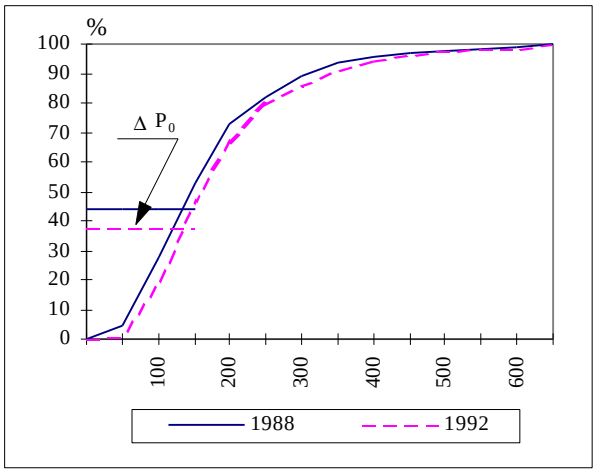



Figure 11 Rural Areas, rural nonfarm

Cumulative distribution functions

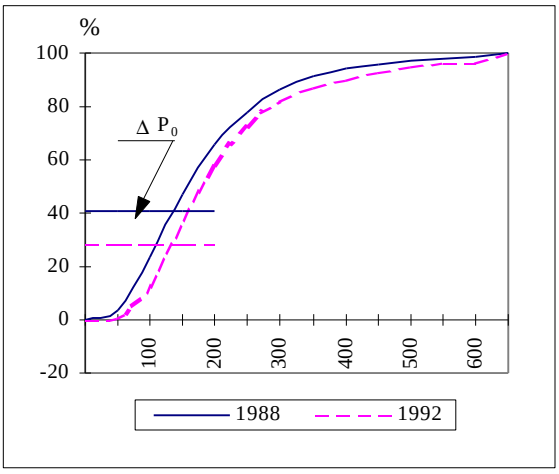
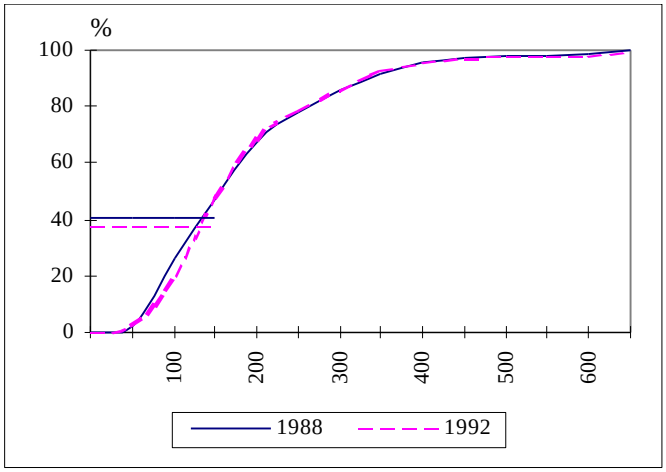


Figure 12 Export farmers
Cumulative distribution functions




In conclusion, social welfare worsened for all socio-economic groups in Accra. For Other Cities, a relatively large improvement benefited informal group and the better-off food-crop farmers. The improvement for formal employees was slight and there was no improvement for poor food-crop farmers. It is noticeable that the living standard of the population in formal sector has declined in Accra but not in Other Cities. The downsizing of the public sector, especially the civil service, apparently had different impact on local economy in different localities. In rural areas improvement mostly took place for food crop farmers and non-farm group; there was some improvement for poor export farmers, but not for non-poor export farmers.

That the urban-formal group in Other Cities maintained its living standard could be because they were able to supplement their wage income with earnings from informal sector activities. This was probably conditioned on the fact that the informal sector was much larger than the formal sector in Other Cities. In Accra, most likely, because over 50 percent of population depend on formal sector employment, a sudden decline in formal sector dominated the local economy. The relatively small informal sector in Accra was not able to pull the economy out of the recession. It is apparent from the above graphs that within each locality, the changes of welfare are quite similar for different socio-economic groups. Therefore, an integrated regional development strategy may prove to be effective in improving the living standard of a population.

## *IV. Decomposition of the changes in poverty incidence*

The analysis reported so far has shown that over the periods of 1988-92 and 1989-1992 the degree of inequality in the distribution of expenditure moved in different directions in different regions and for the different socio-economic groups. At the same time the mean levels of household expenditure also changed in different degrees. The over-all distribution in the economy as whole would then be dependent on the shifts in the population of households between the various regions and groups.

In the later years of the structural adjustment program we would expect more people to be drawn to the food sector, much of which is located in rural areas and small towns, as the relative price of food improves. The adjustment program also involved a downsizing of the public sector, especially the civil service. Therefore, we would expect to see a shift of resources-- including labor-- to the tradable sectors. In Ghana this sector comprised important export crops located in rural areas, as well as industry located largely in the Accra region. Here the regional implications on poverty reduction of the expected relocation are not obvious.

We can study empirically how poverty changes are affected by population shifts, changes in mean incomes and in the distribution of income at the lower end by a decomposition analysis. Let $P_{0j}$ be poverty incidence (i.e. proportion of population under the poverty line) for a sub-group of a population, and $P_{mj}$ be the mean expenditure per capita of that group, then the poverty incidence of the sub-group can be expressed as a decreasing function of mean expenditure per capita and an increasing function of inequality measure:

$$(1)\ P_{0j} = \frac{K_j}{P_{mj}},$$

where $K_j$ is an inequality index at the lower end of distribution.[5] A negative change in $K_j$ would contribute to poverty reduction and a positive one would contribute to an increase in poverty. The opposite is obviously hold for mean expenditure per capita. The poverty incidence for the whole population is then just an weighted average of poverty incidence from all sub-groups:

$$(2)\qquad \overline{P}_0 = \sum_j S_j P_{0j} = \sum S_j \frac{K_j}{P_{mj}}$$

where $\overline{P}_0$ is weighted mean $P_{0j}$ of all sub-groups, j is the index for sub-groups, such as localities or socio-economic groups, and $S_j$ is the sub-group's share of population. The percent change in $\Delta\overline{P}_0$ can then be explained by the changes in population share $S_j$, in the change in inequality index and the mean expenditure (see appendix for details):

$$(3)\ \Delta\overline{P}_0 = \sum S_j \frac{P_{0j}}{\overline{P}_0}\{\Delta S_j + \Delta K_j - \Delta P_{mj}\},$$

[5] Since poverty reduction can be explained by income growth and changes in inequality at the lower end of distribution, $K_j$ is by default an inequality measure of the distribution. It is not Gini coefficient, nor it belongs to Entropy class measures. It is essentially a part of poverty not explained by income growth.

where $\Delta$ represents percentage change. The first component $\Delta S_j$ tells how migration of a sub-group affects the changes in poverty incidence. The second component $\Delta K_j$ tells the change of inequality of a sub-group. The third component, $\Delta P_{mi}$, tells how mean expenditure changes in a sub-group, j. This methodology will be applied to locality decomposition in Ghana, and socio-economic group decomposition within each locality, respectively, presented in sections 4.a) and 4.b) bellow.

*4.a) Poverty decomposition by locality in Ghana*

Table 4a presents the decomposition of the change in poverty incidence between 1988 and 1992 into the changes of the three components presented in equation (3) in each of the three localities, both weighted and not weighted. Table 4a shows that there was a 15 percent decrease in poverty incidence between 1988 and 1992 for Ghana. Table 4b presents the same decomposition between 1989 and 1992, which shows that there was a 14 percent decrease in poverty incidence. Figure 13 presents the contribution of each component from each locality to the total poverty reduction in Ghana between 1988-1992. In this 15 percent decrease, 70 percentage comes from the increase in mean expenditure per capita, $P_{mi}$, in Rural Areas (10.4, the weighted change, divided by 15).

Table 4a also shows that the improvement in inequality, $K_j$ in rural areas contributed substantially, over 30 percent, to the overall poverty deduction in Ghana between 1988 and 1992. The comparison between 1989 and 1992, however, shows that the distribution in Rural Areas were worsened, contributing negatively to the poverty reduction (Table 4b). Mean expenditure (per capita) decreased by 17 percent in Accra between 1988 and 1989, and the inequality also worsened significantly, contributing negatively to the poverty reduction in Ghana. In Other Cities, there is a 9 percent increase in mean expenditure per capita between 1988 and 1992, contributing 14 percent to the poverty reduction in Ghana (2.1, the weighted change, divided by 15). The inequality is also improved in Other Cities, contributing another 9 percent to the overall poverty reduction in Ghana.

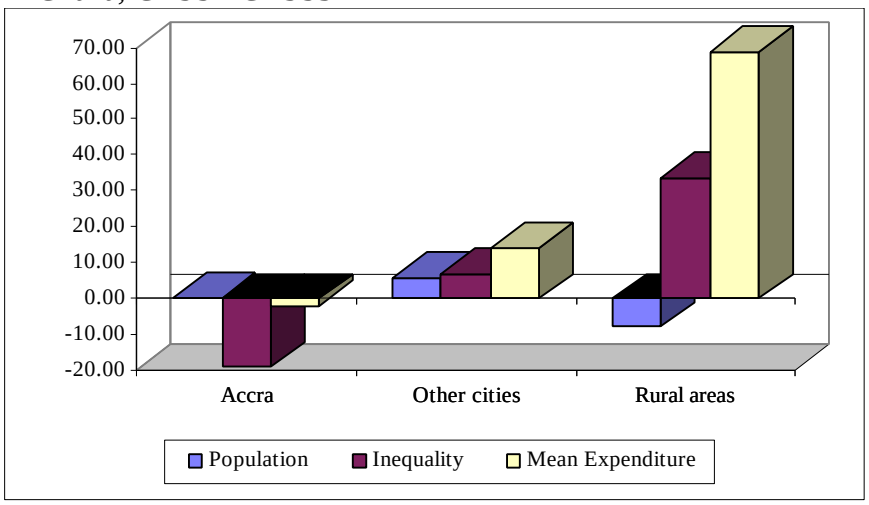
Table 4a Ghana: Decomposition of the percent change in poverty incidence by locality, GLSS1-GLSS3

| | $\Delta S_j$ | | $\Delta(K_j)$ | | $-\Delta P_{mj}$ | | $\Delta \overline{P}_0$ |
|---|---|---|---|---|---|---|---|
| | Actual | Weighted | Actual | Weighted | Actual | Weighted | |
| Accra | -1.4 | *-0.03* | 153 | *2.9* | 17 | *0.3* | |
| Other Cities | -3.7 | *-0.9* | -4.4 | *-1.0* | -9.0 | *-2.1* | |
| Rural Areas | 1.6 | *1.2* | -6.6 | *-5.1* | -14 | *-10.4* | |
| Ghana | | | | | | | *-15* |

Table 4b Ghana: Decomposition of the percent change in poverty incidence by locality GLSS2-GLSS3

| | $\Delta S_j$ | | $\Delta(K_j)$ | | $-\Delta P_{mj}$ | | $\Delta \overline{P}_0$ |
|---|---|---|---|---|---|---|---|
| | Actual | Weighted | Actual | Weighted | Actual | Weighted | Total |
| Accra | -1.4 | -0.05 | 52 | 1.9 | -2 | -0.08 | |
| Other Cities | -3.7 | -0.73 | 2.4 | 0.5 | -12 | -2.5 | |
| Rural Areas | 1.6 | 1.2 | 3.8 | 2.9 | -22 | -17 | |
| Ghana | | | | | | | *-13.7* |

Figure 13 Contribution of migration, inequality and mean expenditure to poverty reduction in Ghana, GLSS1-GLSS3




Since the rural areas performed much better over the period 1988-92, both in terms of mean expenditure per capita and its distribution, it is not surprising to see from Table 4a that there was some redistribution of population from the urban to the rural areas. The shift, however, seems to have occurred more from Other Cities than from Accra, although the mean expenditure increased in the Other Cities and decreased in Accra. A couple of reasons could explain this. First, although expenditure decreased in Accra, it is still the region which has the highest mean expenditure per capita. Second, public services such as education and health are much better in Accra than in rural areas, which makes urban to rural migration unlikely unless the income difference is sufficiently large. Third, it is also possible that there is more integration between the economies of the rural areas and the Other Cities than between the rural areas and Accra.

In summary, the poverty reduction in Ghana over the five-year period between 1988-1992 occurred mostly from the increase in mean income from Rural Areas and Other Cities, as well as from an improvement in distribution in both regions. In Accra, not only mean expenditure has a big decrease, the inequality also worsened greatly. The comparison of between 1989 and 1992, however, shows that poverty reduction is mainly a result of an increase in income, but not an improvement in distribution as shown in the GLSS1 and GLSS3 comparison (see Table 4b).

*4.b) Poverty decomposition by socio-economic group in each locality*

Having investigated how the economy of each of the three locality contributed to the poverty reduction in Ghana, one would like to know how different socio-economic groups contributed to poverty changes in each locality. The same exercise above, therefore, is applied to different localities separately -- with decomposition of the locality-specific percentage change in $P_0$ into the components for three socio-economic groups.

For Accra, Table 5a shows that the overall poverty incidence increased by 166 percent. There was a large contraction of the formal sector in the capital, compensated for by an increase in the informal sector. The mean expenditure decreased and the distribution of expenditure at the lower end also worsened substantially in both sub-sectors -- much more so in the formal sector. It is this deterioration of the distribution which accounted for much of the decrease in living standards for the poor, and the increase in the incidence of poverty in Accra noticed earlier (see Figure 14). The comparison from 1989 and 1992 shows that there is a slight increase in mean expenditure per capita in both Urban Formal and Urban Informal groups, however, poverty incidence increased due to the worsening in inequality.

In Other Cities poverty incidence has decreased by 17 percent during 1988 to 1992. The larger part (95 percent) of it comes from an improvement in expenditure distribution at the lower end and an increase in mean expenditure for the urban informal group. Again there is a shrinking Urban formal sector but a growing urban informal sector (see Figure 15). The comparison between 1989 and 1992 in most part is consistent with the above result except that it shows that inequality in formal sector has worsened, instead of improved.

For Rural Areas, during 1988 and 1992 poverty incidence has decreased by 19 percent, the largest decrease among all three localities. Much of this large part of decrease (67 percent) came from a 12 percent increase in mean expenditures at the farming sector and an improvement in expenditure distribution at the lower end in the informal sector (see Figure 16). In spite of an improvement in expenditure at the farming sector it lost some population over this period (see next paragraph for an explanation). The Informal sector in the rural areas absorbed the labor that was shed by the farming sector. Fortunately for rural welfare, the informal sector in this area performed better than in Accra, registering both an increase in mean expenditure and an improvement in the inequality. Evidently labor was "attracted" to the rural informal sector because of growing incomes. The results from 1989 and 1992 comparison is consistent with these results.

Table 5a. Ghana: Decomposition of percent poverty changes, by Socio-economic Groups

| | $\Delta S_j$ | | $\Delta(K_j)$ | | $\bar{}\Delta P_{mj}$ | | $\Delta \overline{P}_0$ |
|---|---|---|---|---|---|---|---|
| | Actual | Weighted | Actual | Weighted | Actual | Weighted | Total |
| **Accra** | | | | | | | *166* |
| Urban Formal | -20.6 | *-5.7* | 340 | *94.2* | 13.6 | *3.8* | |
| Urban Informal* | 24.4 | *17.6* | 46.9 | *33.9* | 18.7 | *13.5* | |
| **Other Cities** | | | | | | | *-17* |
| Urban Formal | -8.5 | *-2.1* | -9.9 | *-2.4* | -3.1 | *-0.8* | |
| Urban Informal | 5.6 | *3.0* | -18.3 | *-9.7* | -12.3 | *-6.5* | |
| Farming | -0.6 | *-0.1* | 19.6 | *4.4* | -14.9 | *-3.3* | |
| **Rural Areas** | | | | | | | *-19* |
| Formal | -16.5 | *-1.4* | 9.3 | *0.8* | -18.9 | *-1.6* | |
| Informal | 19.7 | *3.0* | -25.6 | *-3.9* | -17.2 | *-2.6* | |
| Farming | -2.3 | *-1.7* | -3.6 | *-2.7* | -11.5 | *-8.8* | |

* There were a few farm households in Accra, which are omitted from the analysis due to the small size of the sample. This is why the change in poverty incidence is slightly different than that in Table 4a.

Table 5b. Ghana: Decomposition of percent poverty changes, by Socio-economic Groups, GLSS2 and GLSS3

| | $\Delta S_j$ | | $\Delta(K_j)$ | | $\bar{}\Delta P_{mj}$ | | $\Delta \overline{P}_0$ |
|---|---|---|---|---|---|---|---|
| | Actual | Weighted | Actual | Weighted | Actual | Weighted | Total |
| **Accra** | | | | | | | *48* |
| Urban Formal | -20.6 | -10.3 | 42.9 | 21.5 | -4.3 | -2.1 | |
| Urban Informal* | 24.40 | 12.2 | 41.5 | 20.7 | -3.3 | -1.6 | |
| **Other Cities** | | | | | | | *-14* |
| Urban Formal | -8.5 | -1.8 | 16.1 | 3.4 | -7.7 | -1.7 | |
| Urban Informal | 5.6 | 2.9 | -9.6 | -4.9 | -14.6 | -7.5 | |
| Farming | -0.6 | -0.2 | 0.8 | 0.2 | -18.3 | -4.9 | |
| **Rural Areas** | | | | | | | *-19* |
| Formal | -16.5 | -1.1 | 29.1 | 1.9 | -23.1 | -1.5 | |
| Nonfarm | 19.7 | 3.0 | -12.5 | -1.9 | -39.7 | -6.0 | |
| Farming | -2.3 | -1.8 | 4.3 | 3.3 | -18.5 | -14.4 | |

Figure 14 The contribution of migration, inequality and mean expenditure to poverty increase in Accra, GLSS1 and GLSS3

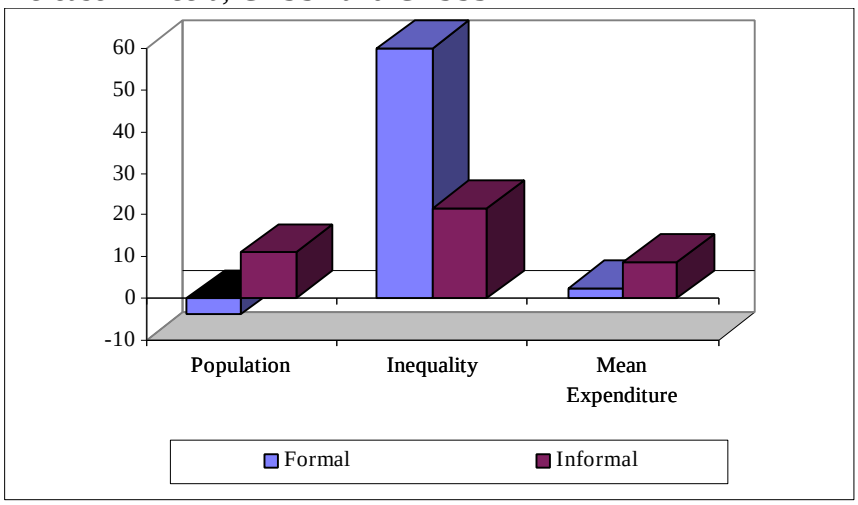



Figure 15 The contribution of migration, inequality and mean expenditure to poverty reduction in Other Cities, GLSS1 and GLSS3

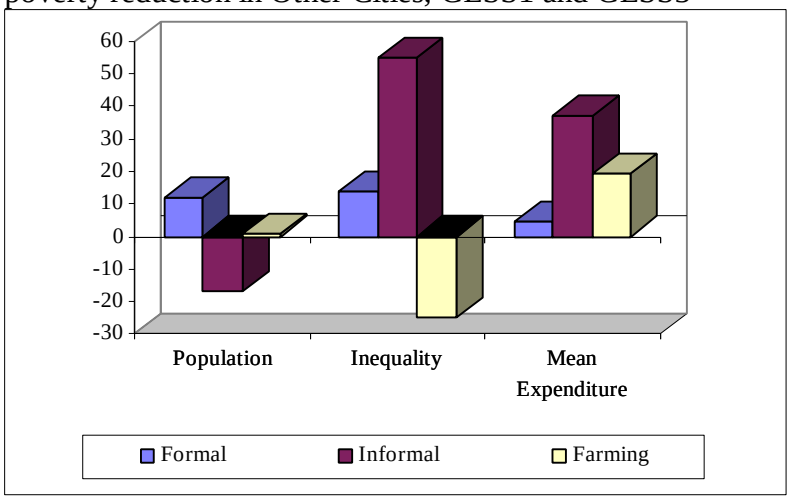
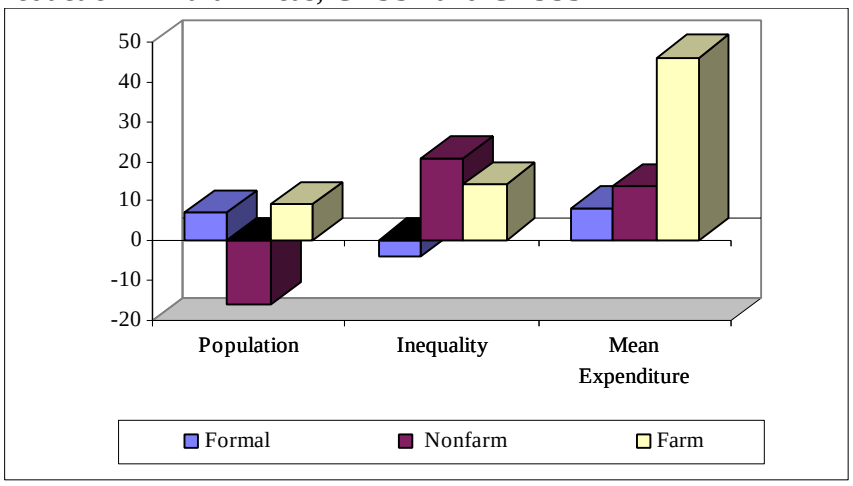


Figure 16 The contribution of migration, inequality and mean expenditure to poverty reduction in Rural Areas, GLSS1 and GLSS3




The comparisons of GLSS1 and GLSS3, and GLSS2 and GLSS3 show that the driving force behind the poverty reduction for Other Cities and Rural Areas are the improvement in inequality in informal sector and an increase in mean expenditure per capita in informal sector for Other Cities and in farming sector for the Rural Areas. Farming seems to be more important in the improvement in the Rural Areas and the informal sector in the Other Cities. But it should be remembered that improvement in the farming group in the Rural Areas does not come necessarily or solely from an increase in agricultural output. The division of the population into the various socio-economic groups is based on the main income source of a household. In an economy in which multiple occupations of earners is the dominant mode, the increase in income could come partly from non-farm activities.

CEM pointed out that informal employment activities cut across all sectors and essentially service-based. During 1988 to 1992, the proportion of rural self-employed working in the service sector increased from 54 to 62 percent, while the share of manufacturing employment -- of the micro- and small-scale type declined from 37 to 31 percent. Table 6 gives the changes in proportions of the different income sources in total income of the different localities. It can be seen that the share of income from non-farm activities -- or the informal sector-- increased rapidly in all localities at the expense of farming.[6]

Thus, to conclude, there is a marked difference in the change in welfare for low income groups in Accra, on the one hand, and in the rural areas and other cities, on the other. Accra declined, but the other two registered substantial improvement. The informal sector, which expanded everywhere at the expense of the formal, contributed to

[6]The GLSS data show that while expenditure declined in Accra, household income measures increased. We tend to accept the expenditure measures as more reliable, but still think that the *shares* of total income from different sources in the total reported would be accurate. In any event the changes in shares are large as can be seen from Table 6.

the decline in Accra, but helped the improvement elsewhere. The farming sector seems to have spearheaded the decline in rural poverty through an increase in mean incomes as well as better distribution. But a larger proportion of the growing income of farming families came from the non-farm. The growth of farm and non-farm income is in fact bound together in the process of economic development and growth.

Table 6. Income shares by locality (share from other incomes not included)

| | *Agriculture* | *Informal/Non-farm* | *Wage* |
|---|---|---|---|
| Accra | | | |
| 1988 | | 34.9 | 41.5 |
| 1992 | | 41.1 | 42.2 |
| *% change* | | *17.7* | *1.6* |
| *Other Cities* | | | |
| 1988 | 23.8 | 39.8 | 24.3 |
| 1992 | 15.6 | 48.8 | 24.4 |
| *% change* | *-34.2* | *22.7* | *0.2* |
| Rural Areas | | | |
| 1988 | 71.7 | 15.6 | 7.5 |
| 1992 | 57.4 | 27.9 | 9.0 |
| *% change* | *-20.0* | *78.7* | *20.7* |

## *V. Determinants of inequality and expenditure level*[7]

We have so far concentrated on a discussion of the way growth and inequality affected different sections of the population in Ghana, particularly the low income groups, during the later stages of the structural adjustment reforms. We now turn to an analysis of inequality and household expenditure level in the economy as a whole. We first employ the techniques of analysis of the entropy class of measures (section 5.a). This is followed by the results of regression analyses (section 5.b).

### *5.a) Entropy class measures of inequality*

The generalized entropy class of measures can be decomposed into "between" and "within group inequality", which can shed light on the determinants of inequality. For expenditure, we choose to use expenditure 'per-single person' instead of expenditure per capita because when using expenditure per capita, a large proportion of variation in expenditure is explained by the household size.[8] Table 7 presents such decomposition with respect to five partitions: sex of household head, socioeconomic group, education level of household head, 10 administrative regions and localities. For the three measurements E(0), E(1), and E(2), Table 8 gives the fraction of inequality that can be explained by the between group inequality of the five partitions. For example, in 1988, 12 percent of E(0) can be explained by the residence of the region, but in 1992, only 5 percent of E(0) can be explained by it.

Table 7 in general shows that the partitions that we can construct capture only a small proportion of inequality. In 1988, all the partition together can explain about 30 percent inequality and in 1992, it decreased to 20 percent. It shows that the administrative region is the most important factor explaining inequality in 1988, but diminished

[7] Analysis up to this point was conducted by expenditure per capita. From this point on we concentrate on expenditure per adult equivalent and per single person (see later for details) in order to control household size effect when we look for variables that determine the changes in expenditure level and variation. Household size effect has not been important up to this point because we have been documenting changes in inequality over time up to this point but not variables that can explain it. In addition, the analysis on Entropy class of measures will be limited to GLSS1 and GLSS3 comparison because early analysis showed that GLSS2 and GLSS3 comparison in most of part showed very consistent results with that of GLSS1 and GLSS3.

[8] It has been well recognized that economies of scale exists in household expenditure, which means that the second household member requires less resources to achieve the same welfare level at the first household member. This is because some household items are shared among household members, such as fuel and utilities. Lanjouw and Ravallion (1994) propose a size elasticity $q$ for measuring welfare of a household and use the measurement $X / n^q$ ($0<q<1$), where $X$ is the total expenditure and $n$ is the size. The size elasticity $q$ gives an discount rate to household size; $n^q$ can be interpreted as the equivalent number of *single-persons.*

significantly in 1992. Education becomes the most important factor in 1992, but only explain about 6 percent of variation. The gender of household head explains little between-group inequality. The explanatory power of socio-economic group also declined between 1988-1992.

Table 7. Ghana: Static Expenditure Per-single-person Inequality Decomposition ($R_B$), GLSS1(1988) and GLSS3(1992)

| | *1988* | | | *1992* | | |
|---|---|---|---|---|---|---|
| Variable | *E(0)* | *E(1)* | *E(2)* | *E(0)* | *E(1)* | *E(2)* |
| Sex of household head | 1.5 | 1.4 | 1.1 | 0.4 | 0.4 | 0.3 |
| Socioeconomic group [a)] | 3.8 | 3.9 | 3.3 | 2.6 | 2.5 | 1.9 |
| Education [b)] | 7.6 | 8.1 | 7.2 | 6.1 | 6.3 | 5.3 |
| Administrative region[c)] | 12.1 | 12.4 | 10.4 | 4.1 | 3.8 | 2.9 |
| Locality | 5.9 | 6.4 | 5.7 | 1.2 | 1.1 | 0.9 |
| All [d)] | 29.0 | 30.5 | 30.2 | 20.8 | 20.5 | 17.4 |

[a)] Socioeconomic groups are defined as 'Farming', 'Nonfarm', 'Wage-formal', 'Urban-informal' and 'Other', the group is determined by the largest share of household income source.
[b)] Education is defined as 'No education', 'some primary', 'completion of primary', 'some middle', 'completion of middle', 'some secondary', 'completion of secondary and 'higher than secondary'.
[c)] Including ten administrative regions.
[d)] The partition by 'all' superimposes all previous partitions simultaneously, excluding the Locality. It is a gauge of joint explanatory power of all partitions.

*5.b) <u>Econometric analysis in decomposing income inequality</u>*

The above analyses are all based on non-parametric methodologies. An alternative way to analyze the determinants of income inequality is to use multivariate regression analysis.[9] Specifically, let Y be expenditure per capita, and Z be variables that can explain the expenditure per capita, then

$$Y_i = \sum a_j Z_{ji} + u_i \; ; \qquad (4)$$

where i=1 to n, indicating n observations, $a_j$ s are the parameters to be estimated, $u_i$ is an error term, assumed to be normally distributed with mean zero and standard deviation $\sigma$, and j=1 to m, indicating m independent variables .

Since

$$\frac{\sum_{j=1}^{m} \mathrm{cov}[a_j Z_{ji}, Y_i]}{s^2(Y)} \equiv \sum_{j=1}^{m} S_j \equiv 100, \qquad (5)$$

[9] This section is based on the methodology developed by Gary S. Fields and Gyeongjoon Yoo, 1995.

where

$$S_j = \frac{\text{cov}[a_j Z_{ji,} Y_i]}{s^2(Y)}. \quad (6)$$

Therefore, the percentage of variance in expenditure per capita or per adult equivalent can be explained by its covariance with each independent variables $Z_j$ and its parameter.

Tables 9 and 10 present the coefficients of regressions and the Sjs for each explanatory variable for GLSS1, GLSS2 and GLSS3, respectively. The dependent variables are the expenditure *per adult equivalent unit (AEU)*, and expenditure *per single persons*, respectively.[10] Expenditure per single person is calculated by using size elasticity 0.7.[11] The regressions generate some very interesting comparisons. As is to be expected household size is an important variable explaining the level and variance of expenditure per adult equivalent unit, but explains much less on expenditure per single persons. This gives a clear advantage to expenditure per single person measurement because it purges the effect of household size and reveals the real effect of other variables on the level and inequality of expenditure. Subsequently, the following discussion will focus on expenditure per single person regression.

More interest attaches the importance of the other variables after controlling for household size. Most of the variables affecting expenditure levels significantly work in the expected direction. Education plays a role in increasing household welfare only after completion of primary (in case of GLSS2) or middle school (in case of GLSS1 and GLSS3). The proportion of earners who are female decrease expenditure levels. Food crop farming decreases levels below those households whose main income sources are in the formal sector. The expenditure level of the households whose income is mainly from nonfarm and informal sector, however, is not different from that of the households in formal sector. The expenditure level is significantly different from region to region.

Education variable explains 20 to 30 percent of variance in expenditure per single person, and it became more important from 1988 to 1992. The ratio of employed household members also became more important from 1988 to 1992 in explaining the variance in expenditure per single person. The most important changes are in the coefficients of the regional variables and in the variance explained by the various sub-regions. The positive expenditure premiums accruing to Western region and to Accra

[10] For calculation of the contribution of explanatory variables to variance in expenditure we used continuous education variable instead of the discrete ones used in regression analysis. This is because while discrete education variables give a better indication on how different education levels affect expenditure levels, the continuous education variable gives a better indication on how it explains the variance in the expenditure.

[11] A 0.7 size elasticity is chosen for this analysis based on the regression results when the effect of household size on the expenditure is minimum but still negative.

have been drastically reduced over the period as have their contribution to the variance. On the other hand, the Central region, Volta, Ashanti, and Upper Eastern have increased the premium, but not so much in increasing the share of explaining the variance of expenditure per single person, except Ashanti, which explains 10 percent variance in 1992 but nearly none in previous years.

Table 9 Parameter estimates of expenditure per adult equivalent and $S_j$ s

| | Parameter estimates | | | Contribution to variance explained | | |
|---|---|---|---|---|---|---|
| Independent Variable | 1988 | 1989 | 1992 | 1988 | 1989 | 1992 |
| 1) Household size | -0.04* | -0.04* | -0.04* | 23.0 | 18.3 | 37.2 |
| 2) Education of household head | | | | 12.6 | 23.9 | 15.7 |
| Some primary | 0.01 | 0.02 | -0.04 | | | |
| Completion of primary | -0.09 | 0.08 | -0.01 | | | |
| Some middle | 0.02 | 0.07 | -0.04 | | | |
| Completion of middle | 0.10* | 0.21* | 0.10* | | | |
| Some secondary | 0.17* | 0.24* | 0.09** | | | |
| Completion of secondary | 0.23* | 0.46* | 0.22* | | | |
| Higher education | 0.37* | 0.65* | 0.45* | | | |
| 3) Sector: | | | | | | |
| Export farming | -0.005 | 0.08 | -0.04 | 3.4 | 2.2 | 7.4 |
| Food crop farming | -0.07* | -0.03 | -0.08* | 0.1 | 0.0 | 0.6 |
| Nonfarm | 0.01 | 0.03 | 0.07* | 0.3 | 0.0 | 0.3 |
| Informal | -0.04 | -0.005 | -0.01 | -0.5 | -0.3 | -0.5 |
| 4) Sex of household head male=1, female=0 | 0.01 | 0.04 | -0.08* | 0.5 | 0.5 | -1.8 |
| 5) Region: | | | | | | |
| Western | 0.48* | 0.53* | 0.13* | 12.9 | 6.6 | -1.5 |
| Central | 0.05 | 0.37* | 0.29* | -0.8 | -1.3 | 4.2 |
| Greater Accra | 0.48* | 0.52* | 0.19* | 24.9 | 16.3 | 3.8 |
| Eastern | 0.23 | 0.39* | 0.23* | -0.3 | -1.3 | 0.3 |
| Volta | 0.05* | 0.24* | 0.19* | -0.8 | -3.5 | -1.2 |
| Ashanti | 0.21* | 0.45* | 0.35* | -1.2 | 2.4 | 13.1 |
| Brong-Ahafo | 0.33* | 0.79* | 0.20* | 1.0 | 19.5 | -2.9 |
| Northern | 0.22* | 0.24* | 0.19* | -1.9 | -3.5 | -3.8 |
| Upper Eastern | -0.05 | -0.18* | 0.35* | 0.9 | 4.9 | -1.6 |
| 6) Experience of hhd head | 0.01* | 0.01* | 0.0008 | -16.7 | -36.8 | 5.5 |
| 7) (Experience of hhd head)$^2$ | -0.0002* | -0.0003* | -0.0001* | 32.1 | 48.2 | 13.8 |
| 8) Employment ratio | 0.15* | 0.15* | 0.16* | 2.7 | 3.3 | 6.7 |
| 9) Female employed | -0.13* | -0.02* | -0.10* | 7.8 | 0.4 | 4.6 |
| ***R-square*** | ***0.27*** | ***0.29*** | ***0.19*** | ***0.27*** | ***0.28*** | ***0.18*** |

Note: '*' indicates that the parameter is statistically significant from zero at 5 percent level, and '**' at 10 percent level. GLSS2 (1989) data is adjusted. The adjusted data from GLSS3 yield similar results, which are presented in the Appendix A.

Table 10 Parameter estimates of expenditure per single persons and $S_j$s

| | Parameter estimates | | | Contribution to variance explained | | |
|---|---|---|---|---|---|---|
| Independent Variable | 1988 | 1989 | 1992 | 1988 | 1989 | 1992 |
| 1) Household size | -0.01* | -0.02* | -0.02* | 4.7 | 7.2 | 13.5 |
| 2) Education of household head | | | | 19.2 | 30.0 | 26.5 |
| Some primary | 0.03 | 0.03 | -0.03 | | | |
| Completion of primary | -0.06 | 0.12* | 0.04 | | | |
| Some middle | 0.05 | 0.12* | 0.0004 | | | |
| Completion of middle | 0.17* | 0.27* | 0.17* | | | |
| Some secondary | 0.22* | 0.33* | 0.19* | | | |
| Completion of secondary | 0.34* | 0.57* | 0.33* | | | |
| Higher education | 0.52* | 0.75* | 0.60* | | | |
| 3) Sector: | | | | | | |
| Export farming | -0.11 | 0.05 | -0.14* | 5.5 | 3.2 | 11.1 |
| Food crop farming | -0.06* | -0.06* | -0.10* | 0.1 | 0.1 | 0.8 |
| Nonfarm | -0.02 | 0.01 | 0.01 | 0.8 | 0.1 | -0.2 |
| Informal | -0.04 | 0.01 | -0.01 | -0.5 | -0.1 | -0.5 |
| 4) Sex of household head male=1, female=0 | 0.03 | 0.14* | -0.05* | 2.0 | 5.7 | -2.1 |
| 5) Region: | | | | | | |
| Western | 0.40* | 0.46* | 0.08 | 10.6 | 5.8 | -0.9 |
| Central | -0.04 | 0.28* | 0.20* | 1.2 | -1.9 | 1.0 |
| Greater Accra | 0.45* | 0.49* | 0.15* | 25.3 | 17.4 | 3.4 |
| Eastern | 0.15* | 0.30* | 0.17* | -0.3 | -1.3 | -0.4 |
| Volta | -0.01 | 0.16* | 0.15* | 0.5 | -2.5 | -0.5 |
| Ashanti | 0.14* | 0.38* | 0.28* | -1.8 | -0.8 | 9.9 |
| Brong-Ahafo | 0.24* | 0.70* | 0.14* | 0.7 | 17.6 | -2.1 |
| Northern | 0.21* | 0.19* | 0.18* | -0.8 | -2.2 | -2.4 |
| Upper Eastern | -0.06 | -0.19* | 0.34* | 0.8 | 4.6 | 0.2 |
| 6) Experience of hhd head | 0.01* | 0.02* | 0.01* | -20.2 | -37.4 | -11.1 |
| 7) (Experience of hhd head)$^2$ | -0.0002* | -0.0003* | -0.0001* | 21.7 | 37.7 | 9.6 |
| 8) Employment ratio | 0.50* | 0.45* | 0.46* | 19.1 | 16.2 | 33.8 |
| 9) Female employed | -0.19* | -0.02* | -0.17* | 11.5 | 0.5 | 10.5 |
| ***R-square*** | ***0.26*** | ***0.28*** | ***0.18*** | ***0.26*** | ***0.28*** | ***0.17*** |

## *VI. Concluding remarks*

Previous work on the GLSS surveys have concentrated on the study of poverty incidence. This paper has sought to extend the analysis to a study of changes of the levels of household welfare (measured by expenditure per capita, per AEU and per single person) and their distribution over the period 1988-92, a period in which the structural adjustment programs had some time to work themselves out. We look at changes in different localities, and in different socio-economic groups within them. The more important results can be summarized as follows.

1. A study of different measures of inequality reveal that the most important changes in the degree of inequality took place at the lower end of the distribution. But the direction

of change was different in Accra compared to the localities outside Accra. In Accra while inequality increased over-all, the degree of inequality in the lower part of the distribution increased much more. In the case of the Other Cities, there was a more or less uniform improvement all along the distribution. But in the case of the Rural Areas there is a significant improvement at the lower end, but a deterioration at the upper end.

2. The changes in the welfare within each "locality" were analyzed using stochastic dominance analysis in terms of socio-economic groups: the formal sector; informal/nonfarm sector; food crop farmers; and export crop farmers. An overview of the cumulative distribution functions shows that both the formal and informal sector groups in Accra suffered over the 1988-92 period, the formal sector more at the low end and the informal sector more at the middle range of the income distribution. In Other Cities, welfare improved significantly in informal sector, slightly in formal sector, but worsened for food crop farmers at the lower end of distribution. In the Rural Areas food crop farmers experience improvement at the low to middle levels, and so did non-farm and export farmers.

3. Major shifts in the population occurred in all localities from the formal to the informal sector, but the magnitude of the shift was largest in Accra -- in fact several times more than in the other localities. The deterioration of the income at the lower part of the distribution in both the formal and the informal sectors is mainly responsible for the decline in the welfare of the low income households in Accra. Overall our calculations show that the improvement in means expenditure and distribution in the Rural Areas and in the Other Cities--largely from informal sector activities--accounted for the major part of the poverty reduction.

4. Evidently, the structural adjustment changes affected the economy of Accra differently from that of the Other Cities and Rural Areas. In a more general sense we can establish the conclusion that structural adjustment was successful in raising income and its distribution in the Rural Areas and Other Cities. However, in Accra the contraction of the formal sector failed to produce compensating changes. Clearly the tradable sector located in the capital did not respond to the adjustment policies as might have been expected from theory. This could be explained, at least partially, by the fact that the dominant economic activities are different in different localities. While public sector activities dominate Accra economy, inform/nonfarm and farming sector activities dominate Other Cities and Rural Areas. As adjustment reforms aim at reducing the public expenditure in favor of informal/farming sector activities, Accra's informal sector was obviously not large and/or strong enough to absorb the sudden shock from the formal sector. By comparison, the relatively large informal sectors in Other Cities and Rural Areas were apparently stimulated by the adjustment reforms and were able to compensate the shock from formal sector, which was relatively small in the local economy.

5. The analysis of the determinants of the *average* expenditure per single person or per adult equivalent in Section V (b) showed an alarming result that the poor continue to benefit less from education than the nonpoor, demonstrated by the increasing importance

of education in explaining expenditure variance -- the inequality. This is because education contributes to the improvement of household welfare only after the completion of middle school, which poses significant barrier for the poor. To increase the education benefit for the poor, it is necessary to design primary education curricula to provide knowledge for income earning skills for the poor. This education should also include knowledge for girls in family planning, hygiene, food preparation and nutrition, and therefore to enhance the impact of economic growth on the improvement of the living standard.

6. Another important point emerging from this section is the evidence how the role of different administrative regions changed over the period in determining household welfare. While the decline of the importance of Accra is already apparent from the earlier evidence, some of the other regional changes require further explanation and research.

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## *Appendix A*

There have been many discussions on whether the three GLSS surveys comparable. Jones and Xiao (1995) concluded that it is plausible that there was a small reduction in poverty between 1988 and 1992, but the magnitude of the reduction could be well overstated by the GLSS data due to changes in the questionnaire that bias the GLSS3 estimates upwards relative to earlier years. Demery and Mehra (1997) especially raised doubts on the comparability of GLSS1 and GLSS3. They pointed out that although all three rounds were conducted on a nationally representative sample of households, changes made to the questionnaire in successive rounds should counsel caution in comparing results.

To investigate what impact of the changes in the questionnaire could have had on the level of expenditure, Demery and Mehra made adjustments to the data so that the data are more comparable. They then used the adjusted data with redefined poverty lines to measure poverty incidences for 1988, 1989 and 1992. The adjustments they made included correcting recall errors for frequently-occurring food expenditures and for home-produced food consumption in GLSS1 and GLSS2; adjusting upward by 15 percent of the estimates of home-produced food consumption from GLSS1/2, and purging the food expenditure aggregates of all non-common elements (GLSS3 asked a much greater number of food items than GLSS1/2 did). They then recalculated poverty lines separately for each year, which was defined as the food poverty line plus the non-food components. After these adjustments, they concluded that there was no poverty reduction between 1988 and 1992, poverty incidence is 0.261 in 1988 and 0.274 in 1992.

In our study, we chose to use the unadjusted data to be consistent with the estimates presented by Ghana Country Economic Memorandum and the Poverty Assessment. We would like to explore more about the data differences in the future when the adjusted GLSS1 is available to us. However, in the Appendix we present stochastic dominance analysis for adjusted GLSS2 and GLSS3 data. The adjusted GLSS2 and GLSS3 data show very similar patterns as GLSS1 and GLSS3 unadjusted data comparison. Figures A.1 to A.4 show that the comparison between GLSS2 and GLSS3 are very similar to that of GLSS1 and GLSS3, except for Accra. GLSS2 does not dominate GLSS3 for Accra like GLSS1 dominates GLSS3.

Figure A.1 Ghana: Cumulative Distribution Functions, 1989-1992

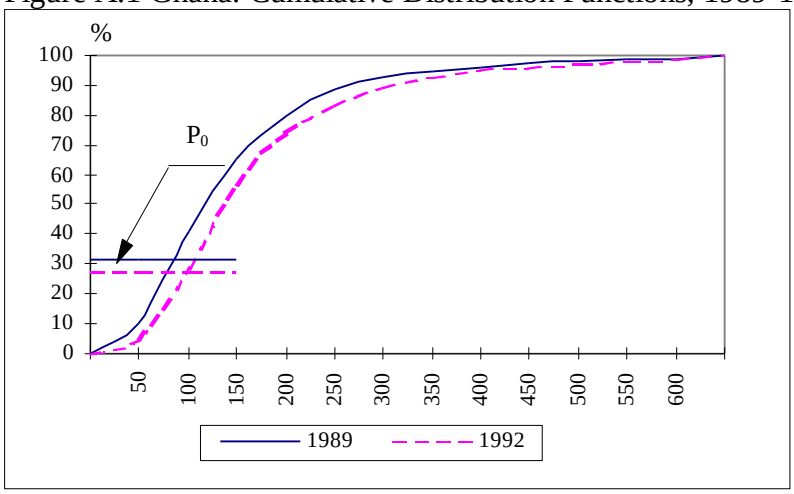



Figure A.2 Accra: Cumulative Distribution Functions, 1989-1992

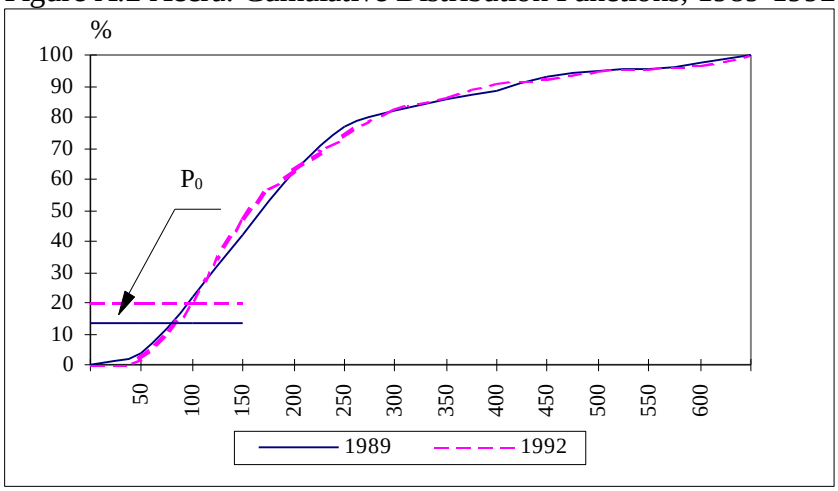


Figure A.3 Other Cities: Cumulative Distribution Functions, 1989-1992

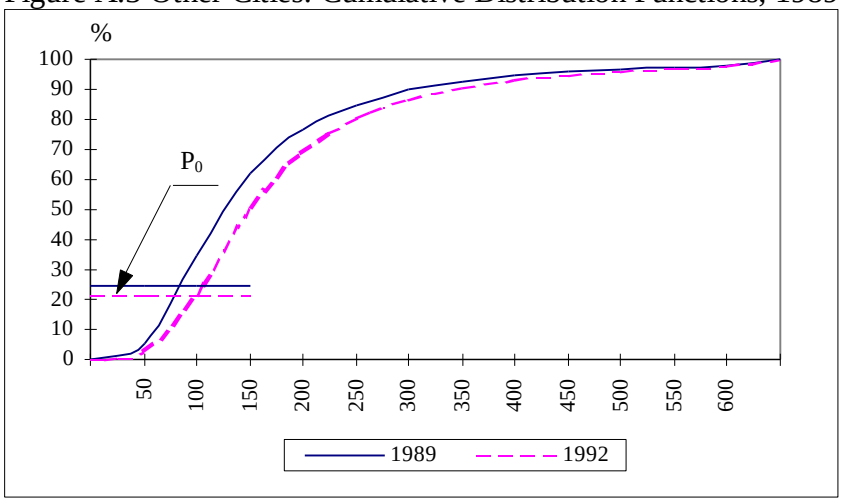
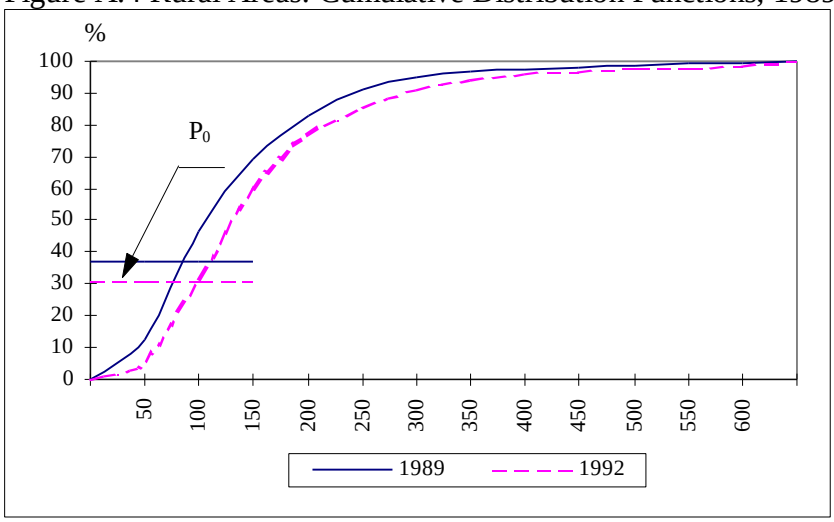



Figure A.4 Rural Areas: Cumulative Distribution Functions, 1989-1992



## *Appendix B*

This Appendix presents the decomposition of poverty incidence and Entropy Class measures.

*a) Decomposition of poverty incidence*

The poverty decomposition equation (3) in section IV is derived as following:
since

(1) $$\overline{P}_0 = \sum_j S_j P_{0j} = \sum S_j \frac{K_j}{P_{mj}},$$

(equation (2) in the text), let ¶ be the partial differential and $\Delta$ be the percent change, then the differential of $\overline{P}_0$ is

(2) $$\P \overline{P}_0 = \sum (\frac{K_j}{P_{mj}}) \P S_j + S_j [\frac{P_{mj} \P K_j - K_j \P P_{mj}}{P_{mj}^2}]$$

$$= \sum \{(\frac{K_j}{P_{mj}}) \P S_j + S_j (\frac{\P K_j}{P_{mj}}) - S_j P_{0j} \Delta P_{mj}\}$$

$$= \sum \{S_j P_{0j} \Delta S_j + S_j P_{0j} \Delta K_j - S_j P_{0j} \Delta P_{mj}\}$$

(Multiplying the first component by $S_j / S_j$ and the second component by $K_j / K_j$); then

(3) $$\Delta \overline{P}_0 = \sum S_j \frac{P_{0j}}{\overline{P}_0} \{\Delta S_j + \Delta K_j - \Delta P_{mj}\}.$$

(Multiplying the both sides of equation (2) by $\overline{P}_0$).

*b) General Entropy Class of Measures and Their Decomposition*

This section is directly quoted from Ahuja et al (1997). While all scalar inequality measures are essentially aggregates of distances between expenditures and the "center" of a distribution, different indices are constructed to be sensitive to different ranges of the distribution. While the mean logarithm deviation (E(0)) is especially sensitive to incomes at the bottom of the distribution, the Theil index (E(1)) is constructed for constant responsiveness across all income ranges, and E(2) is more sensitive to the changes occurred at the higher end of a distribution. Gini coefficient is more sensitive to changes occurred at the middle of a distribution. Let $y_i$ be the income of individual i, $i \in (1, 2, 3, \cdots, n)$, n is the number of individuals in a given distribution, and $m(y)$ is arithmetic mean of the distribution. The three general entropy class measures are defined as following:

$$E(0) = \frac{1}{n}\sum_{i=1}^{n} \log(\frac{m(y)}{y_i}) ;$$

$$E(1) = \frac{1}{n}\sum_{i=1}^{n} \frac{y_i}{m(y)} \log(\frac{y_i}{m(y)}) ; \text{ and}$$

$$E(2) = \frac{1}{2nm(y)^2}\sum_{i=1}^{n} [y_i - m(y)]^2 .$$

The above indices can be decomposed into between- and within-group inequality components. Let a population be partitioned into j group, j=1,2,3,...k, $m(y)_j$ be the mean income in subgroup j, $f_j = n_j / n$ be the population share of subgroup j, and $v_j = \frac{n_j m(y)_j}{nm(y)}$ be the income share of subgroup j. Then between-group component of $E(a)$ is $E(a)_B = \frac{1}{a^2 - a}\left[\sum_{i=1}^{k} f_j \left(\frac{m(y)_j}{m(y)}\right)^a - 1\right]$ and the within-group component of $E(a)$ is $E(a)_W = \sum_{j=1}^{k} w_j E(a)_j$, where the weights are given by $w_j = v_j^a f_j^{1-a}$, then overall inequality $E(a) = E(a)_B + E(a)_W$. The share of inequality explained by a given partition of a population reported in Tables 7 and 8 is $R_B = E(a)_B / E(a)$.

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